

Claims

[c1] **What is claimed is:**

1. A plasma cutting system comprising:
a plasma cutting power source;
a plasma torch operationally connected to the plasma cutting power source; and
a processing unit disposed within the plasma torch and configured to control the plasma cutting power source of a plasma cutting process.

[c2] 2. The plasma cutting system of claim 1 wherein the processing unit is further configured to receive data from a plurality of sensors disposed within the plasma torch.

[c3] 3. The plasma cutting system of claim 2 wherein the processing unit is further configured to interpret feedback from the plurality of sensors and regulate operation of the plasma cutting power source according to the feedback.

[c4] 4. The plasma cutting system of claim 1 wherein the plasma torch is connected to the plasma cutting power source via a communications link such that the process-

ing unit is in communication with the plasma cutting power source.

- [c5] 5. The plasma cutting system of claim 4 wherein the communications link at least supplies power to the welding-type plasma torch.
- [c6] 6. The plasma cutting system of claim 4 wherein the processing unit is further configured to serialize communication with the plasma cutting power source.
- [c7] 7. The plasma cutting system of claim 1 wherein the processing unit is further configured to receive control data from at least one user input and control the plasma cutting process according to the user input.
- [c8] 8. The plasma cutting system of claim 7 wherein the user input is one of at least a start pilot arc command and an adjust amperage control.
- [c9] 9. The plasma cutting system of claim 1 wherein the plasma torch is configured to perform the plasma cutting process with a maximum open circuit output voltage of greater than 220 volts DC.
- [c10] 10. The plasma cutting system of claim 1 wherein the plasma cutting power source includes at least one controller configured to adjust a power output based on at

least control signals from the plasma torch processing unit.

- [c11] 11. The plasma cutting system of claim 1 wherein the processing unit is configured to control the plasma cutting power source by changing more than one operating parameter of the plasma cutting process.
- 12. A controller disposed within a plasma cutting torch, the controller configured to:
 - receive operational feedback regarding a plasma cutting process;
 - process the operational feedback;
 - transmit a control signal to a plasma cutting power source, the control signal having at least one control command that when processed by the plasma cutting power source causes a change in operation of the plasma cutting power source.
- [c12] 13. The controller of claim 12 configured to receive the operational feedback from a plurality of feedback sensors, wherein the feedback sensors include at least one operational feedback sensor and at least one user input sensor.
- [c13] 14. The controller of claim 13 wherein the at least one operational feedback sensor includes at least one of a power source activation indicator, an electrode type indi-

cator, a tip type indicator, a cup position indicator, a consumable indicator, a shorted component indicator, an air pressure indicator, a temperature indicator, a trigger position indicator, a trigger safety indicatory, an operation amperage indicator, a current transfer indictor, and a voltage drop indicator.

- [c14] 15. The controller of claim 13 wherein the plurality of feedback sensors is disposed within the plasma cutting torch.
- [c15] 16. The controller of claim 13 wherein the user-input is one of at least a start pilot arc command and an adjust amperage control.
- [c16] 17. The controller of claim 12 wherein the plasma cutting torch is configured to be operable with multiple plasma cutting power sources.
- [c17] 18. A plasma cutting torch assembly comprising:
 - a torch body enclosing a plasma-cutting electrode;
 - a plurality of sensors disposed within the torch body and configured to provide operational feedback regarding an in-operation plasma cutter; and
 - a processing unit disposed within the torch body to receive feedback from the plurality of sensors and configured to control a plasma cutting process according to

the feedback.

- [c18] 19. The plasma torch assembly of claim 18 wherein the plurality of feedback sensors includes at least one user input sensor, a power source activation sensor, an electrode type indicator, a tip type indicator, a cup position indicator, a consumable indicator, a shorted component indicator, an air pressure indicator, a temperature indicator, a trigger position indicator, a trigger safety indicator, an operation amperage indicator, a current transfer indicator, and a voltage drop indicator.
- [c19] 20. The plasma torch assembly of claim 18 wherein the processing unit disposed within the torch body is further configured to control starting the plasma cutting process.
- [c20] 21. The plasma torch assembly of claim 18 wherein the processing unit is further configured to serialize control commands that when processed by a plasma cutting power source causes a change in the plasma cutting process.
- [c21] 22. The plasma torch assembly of claim 18 wherein the processing unit controls the plasma cutting process by sending control commands to a plasma cutting power source.

